

BULLETIN OF ZOOLOGICAL NOMENCLATURE

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Notices

(1) Applications and correspondence relating to applications to the Commission should be sent to the Executive Secretary at the address given on the inside of the front cover and on the Commission website. English is the official language of the *Bulletin*. Please take careful note of instructions to authors (present in a one or two page form in each volume) as incorrectly formatted applications will be returned to authors for revision. The Commission's Secretariat will answer general nomenclatural (as opposed to purely taxonomic) enquiries and assist with the formulation of applications and, far as it can, check the main nomenclatural references in applications. Correspondence should be sent by e-mail to 'iczn@nhm.ac.uk' where possible.

(2) The Commission votes on applications eight months after they have been published, although this period is normally extended to enable comments to be submitted. Comments for publication relating to applications (either in support or against, or offering alternative solutions) should be submitted as soon as possible. Comments may be edited.

(3) Requests for help and advice on the Code can be made direct to the Commission and other interested parties via the Internet. Membership of the Commission's Discussion List is free of charge. You can subscribe and find out more about the list at <http://list.afriherp.org/mailman/listinfo/iczn-list>.

(4) The Commission also welcomes the submission of general-interest articles on nomenclatural themes or nomenclatural notes on particular issues. These may deal with taxonomy, but should be mainly nomenclatural in content. Articles and notes should be sent to the Executive Secretary.

New applications to the Commission

The following new applications have been received since the last issue of the *Bulletin* (volume 65, part 4, 20 December 2008) went to press. Under Article 82 of the Code, the existing usage of names in the applications is to be maintained until the Commission's rulings on the applications (the Opinions) have been published.

CASE 3483: *Villanyia exilis* Kretzoi, 1956 (Mammalia, Rodentia, ARVICOLIDAE): Request to set aside taxonomic acts subsequent to the original description until the lectotype designation of *Terzea* (1991) in order to conserve prevailing usage. D.F. Mayhew.

CASE 3484: NOMIIDAE Gozis, 1875 (Insecta, Coleoptera): proposed emendation of spelling to NOMIUSIDAE to remove homonymy with NOMIINAE Robertson, 1904 (Insecta, Hymenoptera). M.S. Engel & P. Bouchard.

CASE 3485: *Lychnorhiza lucerna* Haeckel, 1880 (Cnidaria, Scyphozoa, Rhizostomeae): proposed conservation of generic and specific names. A.C. Morandini.

CASE 3486: *Betta anabatooides* Bleeker, 1851 (Osteichthyes, Perciformes): proposed designation of a neotype. T.H. Hui & P.K.L. Ng.

CASE 3487: *Megalosaurus crenatissimus* Depéret, 1896 (currently *Majungasaurus crenatissimus*; Dinosauria, Theropoda): proposed replacement of the holotype by a neotype. M.T. Carrano, D.W. Krause, P.M. O'Connor & S.D. Sampson.

CASE 3488: *Papilio danae* Fabricius, 1775 (currently *Colotis danae*; Insecta, Lepidoptera, PIERIDAE): proposed conservation of prevailing usage by the suppression of *Papilio danae* Hufnagel, 1766. T.B. Larsen & R.I. Vane-Wright.

The International Commission on Zoological Nomenclature

The aim of the Commission is to bring stability to the use of animal names (zoological nomenclature). The Commission does this by: (a) producing, publishing and periodically revising the *International Code of Zoological Nomenclature* (the Code), which deals with the formulation and use of animal names, and (b) considering and ruling on specific cases of nomenclatural uncertainty and dispute about animal names that are not automatically resolved under the provisions of the Code, via applications published in the *Bulletin of Zoological Nomenclature*. Opinions are official rulings of the Commission and come into effect on the day of publication of the *Bulletin*. The Opinions are summarised in the *Official Lists and Indexes of Names and Works in Zoology*. The *Bulletin* also includes papers on general nomenclatural issues and proposed amendments to the Code.

The International Congress of Zoology founded the Commission in 1895. At present, the Commission consists of 22 zoologists from 18 countries, with six more to be elected shortly, whose interests cover most of the main aspects of the animal kingdom, including palaeontology. The Commission is under the patronage of the International Union of Biological Sciences (IUBS). Commission members are elected by the vote of zoologists attending General Assemblies of the IUBS or other appropriate congresses. Nominations for membership may be sent to the Executive Secretary at any time. Further discussion of the Commission's activities can be found in BZN 48: 295–299 (December 1991), BZN 60: supplement, pp. 1–12 (March 2003) and details of the Commission's publications are given on the inside back cover herein and on the ICZN website (www.iczn.org).

Members of the Commission are listed on the inside front cover herein.

The International Trust for Zoological Nomenclature

The International Trust for Zoological Nomenclature (the Trust) was founded in 1947 to manage the Commission's financial matters. It is a registered charity, based in the U.K. (No. 211944). At present, the Trust consists of 31 members from 15 countries. Discussion of the Trust's activities can be found in BZN 60: supplement, pp. 1–12 (March 2003) and on the ICZN website.

Members of the Trust

- Dr M. Dixon (Chairman, U.K.)
Dr P.L. Forey (Secretary and Managing Director, U.K.)
Dr H.M.F.P. André (Belgium)
Dr M.N. Arai (Canada)
Mr H.S. Barlow (Malaysia)
Prof D.J. Brothers (South Africa)
Prof W.T. Chang (China)
Dr J.A. Compton (U.K.)
Mr P. Cooke (U.K.)
The Earl of Cranbrook (U.K.)
Prof J. Forest (France)
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Mr R. Pethiyagoda (Sri Lanka)
Dr A. Polaszek (U.K.)
Mr N.J. Robinson (U.K.)
Ms R. Sangster (U.K.)
Dr A. Wakeham-Dawson (U.K.)

The International Code of Zoological Nomenclature

The aim of the Code is to provide the greatest universality and continuity in the scientific names of animals without restricting the taxonomy or classification of the animals for which the names are used. The current (fourth edition) of the Code was published by the Trust in English and French in 1999, and came into effect on 1 January 2000; this edition supersedes all previous editions. Official texts are available in Catalan, Chinese, Czech, German, Japanese, Russian, Spanish and Ukrainian. See the Commission's website (www.iczn.org) for ordering details.

Contributions to the Discussion on Electronic Publication

Introduction

The ICZN drafted a proposed amendment to the Code that would allow publication of nomenclatural acts in exclusively electronic media to be valid and available (published in BZN 65: 265–275, several other sources, and available here http://www.iczn.org/electronic_publication.html). This proposed document is open for input, and will receive the first consideration at the IUBS meeting in early November 2009. If it passes IUBS consideration, the document will be fine-tuned and subsequently voted on by the Commission. Details of this process are provided in the text accompanying the proposed amendment.

There has been lively discussion of this proposed amendment and the various issues it raises for nomenclature and taxonomy in several online listservers. We have also received comments contributed directly to our office. To bring the comments together by topic, to reach a different audience and to avoid the irony of losing the basis for the final decision because it was not published on durable media, we have assembled a selection of comments here. We feel there is great utility in having these assembled. As for any good debate, these comments may be impassioned, contradictory, insightful, or missing the mark. Yet they allow us to take the measure of the needs and perceptions of the taxonomic community for the future implementation of nomenclature in an age of digital communication.

Comments have occasionally been edited for consistency, readability and style. We attempted to preserve the author's (perceived) original intent, and apologise for any inadvertent changes. The sources for these comments are largely the ICZN listserv (<http://list.afriherp.org/mailman/listinfo/iczn-list>) and Taxacom (<http://mailman.nhm.ku.edu/mailman/listinfo/taxacom>). Further input is welcome, either to the listservers or directly to the ICZN secretariat.

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General comments

I have seen many 'red herrings' about e-publication. As far as I am concerned, the three most important 'real' issues are as follows: 1) Paper publications have a *much* longer history/track-record than electronic archiving. 2) Electronic files cannot be read directly by humans; they minimally require (at least with today's technology) three things: appropriate hardware, appropriate software, and electricity. 3) Compared with paper documents, electronic files are *much* cheaper and faster to replicate

and distribute globally in large quantities, and it is *much* easier to assure that copies are identical. So, as should be obvious, 1) & 2) favour paper, and work against electronic documents; 3) favours electronic documents. [...] The e-publication paradigm does not need to be (indeed, *can not* be) perfect – it need only be as good as, or better than, paper-based publishing. **R. Pyle**

I believe electronic publication is inevitable and moreover that it will enhance the effectiveness and impact of taxonomy. The challenge I am wrestling with is how not to lose the functionality and robustness we have achieved since Linnaeus in the process of changing media. In taxonomy, preserving the chain of evidence on information through time is absolutely critical – and the unit of time is the century. **J. Croft**

Publication quality – Risks and benefits

There is concern that by allowing electronic publication to be Code-compliant, we are at the same time allowing or even encouraging ‘sub-standard’ taxonomy to flourish. I share this concern, and although such ‘sub-standard’ taxonomy is in no way prevented or even constrained by the present Code, the ease and speed of producing an electronic publication (however this is defined) could be feared to cause an explosive growth in ‘sub-standard’ e-only taxonomy. But is this fear warranted? Could we perhaps at least partly prevent this, either through the requirements of proper archiving, which necessarily must be put in place, or by making registration in ZooBank a requirement for e-only published names and nomenclatural acts?

T. Pape

BioMed Central publishes open access, peer reviewed articles in all areas of biomedical research. The journals of the BMC series (e.g. *BMC Biology*, *BMC Evolutionary Biology* and *BMC Ecology*) are supported by outstanding Editorial Board members and both the Editorial Board and the in-house staff take care that peer review is performed at the highest standard. Once published, the formatted PDF and HTML versions of an article are final and we do not allow authors to make post-publication changes. **H. Zauner**

Why is Recommendation 8D on immutability of the publication not mandatory and part of the Code itself?

Furthermore, Recommendation 8C encourages those who publish electronically to also publish on paper. This raised a question about having two versions of the same entity, and which would be ‘the’ published version. A cross-reference to article 21.9 would help clarify the situation. It still leaves open the situation that an electronic and paper publication may have differing formats (PDF could make both look the same, but other solutions wouldn’t), so I wonder if there would be any issues with having two versions of the one publication? **M. Jackson**

Publication quality – Should peer review be part of the discussion?

The Commission has neither the mandate nor the resources nor the intent to assess quality. A name or a nomenclatural act may be available, or it may not. Taxonomy may be ‘good’ or ‘bad’ depending on the outcome of any given review. The Code does give very precise requirements for when names are ‘legal’, i.e. Code-compliant, and

therefore available. Scientific quality remains (and should remain) outside the Code and in the hands of authors, editors, peers, assessment committees and others. Code-compliance is probably to some extent uncontroversial as this is regulated by the Code, and if/when ZooBank is up and running we will get a much better handle on all newly proposed names. ZooBank probably will provide at least some degree of peer review for Code-compliance, as it requires input of publication and type information. **T. Pape**

I think it would be reasonable to include a requirement for names to have peer review before they are legal. This does not stop someone from finding a few friends to provide sympathetic review, or even falsely claiming to have gotten review, but it would provide a constraint. The present wording seems to allow me to simply put a number of new taxa into a file online as long as I send the names into the official registration, format and distribute the file appropriately, and follow the regulations about type designations, etc. Given all the stuff that goes online, there seems to also be a very real risk of inadvertent publication of names. Having the requirement of peer review would be another control; someone who is just putting information on the web would be unlikely to accidentally insert a statement about it being peer reviewed for taxonomic purposes. Standard journals already carry statements about the peer review process, so this would seem to only affect books and more irregular publications (though there are many of the latter in malacology).

D. Campbell

The lack of peer review is not specifically a problem for web-based publications as there are a few 'basement publications' around already. It is true that editors of such publications could bypass a demand for review by asking friends or relatives to be reviewers. A radical solution to this problem might be to demand that new names and nomenclatural changes are only published in publications that are supported by scientific institutions and societies (this support could simply be that the editor in chief is employed by an institution or appointed by a society). It may be impractical, but is it more impractical than the problems caused by names and nomenclatural changes published in 'basement publications'? **T. Simonsen**

I am Editor-in-Chief of *Parasites & Vectors*, an open access, online journal, published by BioMed Central. Online journals offer the same degree of permanency and quality as journals produced in hard copy, and this should qualify them to publish the results of taxonomic research that will be recognised by the ICZN. *Parasites & Vectors* has an Advisory Board and Editorial Board comprising international figures of importance in vector biology and parasitology, thus the quality is of equal standing to print journals. I believe that my comments apply to all BMC journals and to those of other major online publishers, such as PLoS. **C. Arme**

Reviews are suggestions of referees to the author. The author decides whether s/he wants to accept them. The editor decides whether s/he agrees with the author's decision and consequently accepts or rejects the paper. If we give referees ultimate power or try to achieve a consensus before publication, then we will probably avoid some unethical behavior, but we will only publish mainstream work and significantly slow down progress in science. **F. Krell**

In the traditional system, descriptions of new taxa are published in printed journals and many reviewers may check the validity of the new taxa. Thus, a good quality control system remains intact which is not available to many website publications. This is not a mature time for the ICZN to pass this amendment and so it should be rejected. I am sure that you will receive opposing comments like this from taxonomists from all over the world. **V. Prasad**

[**N. Evenhuis** said] ‘Science, by definition, allows for the repeatability of hypotheses (i.e., testing hypotheses). In taxonomy, those hypotheses are one person’s ideas about what constitutes a taxon including how that taxon is defined and circumscribed’, which is one of the reasons I am so disgusted with what we presently accept in the way of peer review. Many folks have interpreted my stance as tweaking the Code so it subsumes peer review (and therefore is equated with censorship), when what I am ‘functionally’ aiming for is to tweak ‘peer review’ so that it will be compatible with the aims of the Code: namely, stability of nomenclature. If names are published that *everyone knows* are homonyms, synonyms, unjustified emendations, inappropriate lectotypes, or whatever, then they create nomenclatural instability by their very existence in print; the core of the problem is that those works were published in the first place. I am not advocating censorship over matters dealing strictly with taxonomic opinions (which ‘obviously’ can vary and change), but in cases where there is clear and obvious error or actual ‘bad faith’ on the part of authors, who would normally find a way to circumvent true and proper peer review, either by accident or design. There are enough such authors throughout our discipline that the nature of the problem and its reality cannot be ignored. For every hundred honest taxonomists, there is a person with fine credentials but who knowingly violates the Code and publishes ‘anyway’. Basically, nomenclature is at the mercy of a thousand different journal editors, many of whom know little or nothing about the Code or its proper application. If the entities presently overseeing scientific publication cannot handle the responsibility (and given that self-publication is still an option, then by definition such authors cannot be stopped conventionally), and if this works against our interests (and therefore against the good of science), then to me it is worth suggesting that we either assume that responsibility or come up with a plan that the broader community can follow to better attain the goal. We need a way to prevent the frauds, crackpots, and incompetents from creating worthless ‘available names’ that does NOT infringe on the legitimate pursuit of science. My vision of community review is the best I can conceive of to meet this aim. **D. Yanega**

Existing media – CD & DVD

We take issue with parts of the proposal because we look back on a rich and positive experience with interactive electronic publications (e.g. on CD/DVD) over more than ten years. We want to continue to contribute to the rapid development of scientific taxonomic research with the innovation of adequate electronic publishing.

We suggest a rewording of *Article 8.4.* as follows: *To be considered as published, works must satisfy the following criteria: 8.4.1. Works must be published and archived on a physically ‘hard’ medium (e.g. on a CD/DVD or on paper at present).* Reasons: 1. Since 2000, the ICZN has allowed taxonomic and scientific works to be published on media other than printed paper (e.g. CD/DVD). This has led to many innovations that rank among the standards of scientific research and publishing today. 2. All

these new interactive ways of presentation cannot be documented on paper without a large loss of data and information. 3. For this reason limiting documentation of taxonomic-scientific works only to printed paper is no longer an option! 4. The core task of the ICZN and the rules is to make sure that taxonomic-scientific results remain available without loss or change independent from the storage medium. The question of the 'half-life' of a CD ROM or the 'acid content' of paper becomes subordinate, because the dynamic advancement of future data carriers has to be part of this data preservation concept. 5. The subject has never been – neither before nor after Gutenberg – the physical stability of data carriers, but the question has always been 'How can it be ensured that data can be passed quickly, comfortably, confidently, error-free and cost-efficiently to the next generation of data carriers?' Biologists should know it best: 'To preserve *life* means to copy life successfully!

We suggest that 8.4.2. should be deleted and replaced with: *Copies of 'hard' physical media have to be archived in at least 5, or even 10 or 25 . . . public libraries; these have to be mentioned by name in the work.* Reasons: 1. As the currently valid code (see Article 8.6) does not set a time in which new methods of publication are to be tested, a revision of this rule would be a serious intervention in commercial vested rights (e.g. involving development costs for interactive programmes, the costs of CD distribution). 2. The rapid scientific advancement in publishing taxonomically significant works during the past 10 years – initiated, among others, by the ICZN – has been accompanied successfully and adequately by digital interactive presentations (e.g. a very large number of pictures, scroll pictures, overlays, microphotography, and computer tomography). This innovation, which allows the extensive documentation of empirically established hypotheses to the reader, cannot be realised on paper (including digital paper, PDF) – not even approximately.

We propose the following rules for works that are published on electronic media (e.g. internet): 8.5.1. *Electronic publications (e.g. interactive publications or digital paper/PDF) must be archived and distributed within 1 year by the editor on a physically 'hard' medium.* 8.5.2. *When work is archived on different media it has to be ensured that a 1:1 reproduction (this means the format remains the same) is guaranteed.* 8.5.3. *In the case of interactive publications, such as CD/DVD at the present time, and in the case of digital paper publications (PDF) it is possible to use paper as well.* Reasons: 1. In principle we appreciate this overdue development for publications on electronic media! 2. It must be assured that the original form and content of the publication – irrespective of the choice of the first medium – are preserved (e.g. interactive publication first on CD ROM and then the interactive structure in the internet, or first publication on paper and then PDF in the internet). A coloured digital publication (PDF) for example, is incompatible with black-and-white publication on paper (information loss or deviations have to be avoided!). *Final comment and recommendation:* Why should we be at odds about this? To question the durability of the media used (e.g. CD ROM or books) is a platitude. The same is true for questioning the durability of archiving institutions. Hence, we recommend the simultaneous utilisation of numerous archiving media, institutions and official registers (e.g. ZooBank).

One of the challenges of modern library sciences is the 'digital archiving' of our archived paper publications, for which great efforts are being made internationally. Let's not go two steps forward and then three backward! **P.E. Stüben & CURCULIO Institute**

Status of e-publications before 2010

It would be useful if the amendment could clarify the retrospective status of e-only publications under the old Code. I would suggest including in the amendment a clarification/confirmation noting that e-only publications predating 2009 will be considered authoritative if they have been deposited in a printed form with a certain set of archival libraries. This would help to resolve the ambiguity in the status of articles such as in *PLoS ONE* and *BMC Evolutionary Biology* which seek to comply with the existing code as far as possible, but find it difficult to know for sure whether they have done so because aspects of the existing code in relation to electronic publication are difficult to interpret and seem somewhat self-contradictory.

M. Cockerill

The amendment is proposed to be effective from 2010. What will happen to the names published in electronic-only journals before that? It would be practical to allow inclusion of all of them from their dates of publication (perhaps this may be permitted under a special provision). **S. Singh**

The proposed amendment of article 8.5 does not take into account article 8.6 of the present code. It states that in order to be considered as published, a work issued and distributed electronically needs to have been issued after 2009. It never states the conditions for electronic publishing in the present code. In most articles of the present code, names available for nomenclatural usage that followed the rules of previous editions of the Code at the time they were published are considered valid, even if they do not follow the conditions of the present code. Article 8.6 is completely reformed in the proposal, thereby forgetting what the current 8.6 states.

In order to protect names published after 1999 under the current article 8.6, I propose the following version of article 8.5 of the amendment:

8.5. Works issued and distributed electronically. To be considered published, a work issued and distributed electronically must

8.5.1. Have been issued *after 1999*,

8.5.2. *contain a statement that copies (in the form in which it is published) have been deposited in at least 5 major publicly accessible libraries which are identified by name in the work itself, if the work was produced after 1999 and before 2010,*

Example. On 28 May 2008 Fisher and Smith published three new species of ants (Hymenoptera: Formicidae) in the open access, peer-reviewed journal PLoS ONE which is published only online. However, they deposited printed versions and PDFs in the following institutions: Natural History Museum, London; American Museum of Natural History; Smithsonian National Museum of Natural History; Muséum National d'Histoire Naturelle; Russian Academy of Sciences; and Academia Sinica. Hence their descriptions are valid.

8.5.3. state the date of publication in the work itself *if produced after 2009*, and

8.5.4. be archived in an organization other than the publisher in a manner compliant with ISO standard 14721: 2003 for an Open Archive Information System (OAIS), or the successors to that standard, *if the work was produced after 2009*. (For documentation of the location of the archive, see Article 10.9.2.1).

The remainder of Article 8.5.4 (8.5.4.1, 8.5.4.2 and 8.5.4.3) would be exactly as in the currently proposed amendment articles 8.5.3.1, 8.5.3.2 and 8.5.3.3 **E. Alvarado Reyes**

ZooBank and registration – general

Article 10.9.1 requires a registration number to be cited in ‘the work itself’, implying that before a name is electronically published it must be registered in ZooBank to obtain a number. Adding a number retrospectively would go against the spirit of *Rec. 8D*. So it’s imposing an additional burden in that an author must prepare the paper, register names (before they are published) in ZooBank, add the registration numbers to the paper, then once the work is electronically published go back to ZooBank and add full bibliographic information. Also, there is the possibility of introducing errors, say if a name was changed at the last minute. Would it still be available if there wasn’t an exact match between the registry and the publication?

Furthermore, there is the possibility of electronic works being in limbo for at least a year if they are not immediately archived. (8.5.3.3). **K. Challis**

We certainly recognise that registration of names and community review on taxonomy are two entirely different issues. Review of names should be restricted to nomenclatural points – such as homonymy, type depository, absolute synonymy based on the same specimen, quality of description (not the quality of taxonomy; for example whether the description fulfils the minimum requirement to distinguish the nominative taxon from others). If the Code governs the quality of taxonomy, the results of which are nomenclatural acts, this would mean that the Code starts governing the methodology in taxonomy, including species concepts. Evaluation of the scientific content of a work may differ according to the opinions of scientific society at a given time, but we should secure the stability of names, as they are the communication medium for any such evaluation. **J. Kojima**

It is true that we are looking backwards. It comes with the territory. Nomenclature is all about looking backwards (the Codes are retroactive), while serving the needs of the present and the future. For nomenclature, the way it works now, it is important to have an unalterable document published at a single point in time. How else to establish priority? It may be interesting to speculate about an entirely different way to go about it, with a central register as the only evidence that counts, and the ‘original publication’ only an entry in a database, but this represents more than mere evolution of what was here before. It is a complete break with the established way of doing things, and I would not even dare guess at what the consequences of such a break would be. It would mean starting all over again (like the Bacterial Code did, but even more radical, and with a lot more taxa involved), moving into practically uncharted territory. **P. van Rijkevorsel**

ZooBank and registration – Two-tiered taxonomy

There will be a problem if ZooBank registration is required of only electronically published names and changes. This will only create first and second level taxonomic works. If anything, the need for registration is lesser for the easily searchable e-publications compared to paper publications. It is very well to recommend that journal editors ask authors to register names and changes. But why not have one rule for all? **T. Simonsen**

One of the proposed advantages of registration was supposed to be there would be no surprise taxa anymore. But with this scheme there will be no wonderful database of all new species – one will still have to ferret around looking for obscure new taxa in paper publications. And without universal registration people will still be able to (irritatingly & adding to confusion) publish the same species name more than once.

G. Read

You are setting up a two-tier system, with registration being a requirement for electronically published names but not for traditionally printed names. Why should the two sorts of publication be treated differently? I can see that it's one way of ensuring that electronically published names become widely known, but surely names published in certain obscure journals are also easily overlooked. Of course, if there's some resistance to registration of names, this could be a way of introducing it gradually. However, I wonder if a partial registry would only be of limited use?

K. Challis

The sustainable business model for ZooBank/ICZN needs to be addressed in the context of e-publication. As it stands now, ZooBank is physically close to a one-man show (though a fantastic one), the ICZN Secretariat has no funding secured beyond little more than a year. Any scientific field needs to secure its infrastructure – in our case taxonomic publications and ZooBank. Sticking to print does a big disservice in a world that is electronic. Nobody will fund an organisation that is relying on finding prints from all over the world – a system that so far proved inefficient. **D. Agosti**

Increased access as a result of current technology – open access

Web-based, open-access publication is the only way forward for science (not just taxonomy). Paper-based publications (including subscription-based access to PDFs) is all very well for those of us who have access to large research libraries. But an increasing number of scientists and others with an interest in science haven't got that. Access to a computer, the internet, and electricity are often easier to come by than access to a library. And if you are physically away from the library, you need access to these three anyway. I think that *Canadian Journal of Arthropod Identification* (a web-based journal devoted to the publication of works related to Canadian Arthropod recognition and documentation) is an excellent example of the direction we could, and in my opinion should, move. **T. Simonsen**

Clearly, we need to be able to document what an author meant when s/he described a new taxon. The best way to do so is to ensure that the description is accessible online – I would, in fact, make it a requirement in the next Code that new nomenclatorial acts are valid if the underlying documents are online discoverable and available. This allows access to the baseline data we create for the whole scientific community. It opens up our science, and allows wide access to the data that is not given by most of the 1000 serials or books with taxonomic content. Such copies can easily be distributed in many archives, one of which ought to be the ICZN/ZooBank. Finally, moving from print to open-access e-publication is a very basic move to democratise our science and open it up beyond the few privileged with access.

D. Agosti

In an ideal world, access to complete articles (not just Abstracts) should be entirely open and free to all worldwide, via the internet. Copyright of all works is vested in the author but others are free to use the material, with appropriate acknowledgments. Other workers would have the opportunity to comment on publications via a facility on the home page, thereby engaging the community in debate, if appropriate.

C. Arme

Increased access as a result of current technology – Developing countries, workers without access to major libraries

Online systems are not available to many scientists in the world. In addition, scientists like to see and work with printed descriptions of taxa. **V. Prasad**

There should be provision for making the electronic publications freely available to the taxonomic workers of less developed countries. **S. Singh**

Evolutionary Biologists, as authors, embrace the advantages of online, open access publishing to ensure wide dissemination of their work and, as readers, enjoy free and easy access to research articles from anywhere in the world. We are enthusiastic about initiatives to share and cross-link taxonomic and biodiversity data and we are committed to supporting the scientific community in their task of describing the vast number of species that are still unknown to science. We are aware of the importance of stability of species names. We do not produce print issues of our journals, but we ensure that our content is permanently available to everyone. Following publication, the full text of each article is immediately and permanently archived in PubMed Central, the US National Library of Medicine's full-text repository of life science literature, and also in repositories at the University of Potsdam in Germany, at INIST in France and in e-Depot, the National Library of the Netherlands' digital archive of all electronic publications. BioMed Central is also part of the LOCKSS initiative which helps libraries to archive digital content. We are convinced that the open access, online articles published in our peer reviewed journals are at least as permanently accessible as articles in print journals, with the added benefit of wide and free dissemination and the advantage of being able to apply new tools to manage and explore biodiversity data. **H. Zauner**

Electronic-only publications should be allowed if mechanisms can be found that give reasonable assurance of the long-term accessibility of the information they contain. Thinking in terms of advancing technology, and the tangled unknowns of 'permanence' on the web and of software formats, it seems rather likely (to me) that in the year 2109 the information contained in these electronic-only publications will only be accessible via the printouts done by the scientists in the early 21st century! I'm quite sure that's not the intent of 'long-term accessibility' here though. What precisely is a 'reasonable assurance of long-term accessibility'? **S.D. Gaimari**

Speed of taxonomic work and benefits of atomized, cross-linked content

Consider the time when your virtual expedition makes use of a parataxonomist somewhere remote who collects a living organism, produces a high resolution three dimensional image from which you derive a description, sequences the entire genome which you analyse and, Eureka!, you recognise that you have an undescribed species.

In your working environment you give your reasons for its novelty and press the button marked publish (having previously registered the name with whatever 'Name Bank' is appropriate). But then, at the speed of light, your new species is instantly synonymized everywhere it is considered relevant by automated systems which compare your description with everything that is known of the parent taxon of your new species and all its nearest relatives . . . and the systems come to a different conclusion (ditto with the molecular data). That's the sort of peer review that's possible when everything is joined up. It's no different really from what happens now it's just that the synonymy is much faster.

We are still stuck thinking of a future in the two-dimensional world of digital sheets of paper instead of the highly atomized data we should be aiming for. Equally, when we think of the information from the past, we are thinking of reading digital representations of the real sheets of paper rather than thinking about working with the atomized content (with the images of the original pages in the background somewhere just in case they are needed). **P. Kirk**

Format issues and retrievability in the future – general

Documents themselves will be carried forward, but I don't think the file format issue is a red herring, or that it's a lesson that's been well-learned. The big problem is that the de facto standard is PDF, a proprietary format that can't be easily reverse-engineered to display correctly if you have the file but not Acrobat (as far as I know; maybe I'm wrong?), or even have the text extractable from a non-functional file (and of course some don't have 'text' at all, just an image of the writing). I already have PDF documents from five years ago that refuse to open. I haven't tried that hard to recover them, so maybe they could be repaired, but I'd rather not be taking that kind of risk on things like descriptions that are supposed to last at least as long as paper documents. **K. Magnacca**

There are a number of different PDF viewers available for Windows, Mac and Unix platforms. However, they don't all support all the features that Adobe stuffs into its version of PDF. If we can agree on a sufficient subset of features, it is entirely possible to produce PDF files that will be readable into the future, with or without the ongoing existence of Adobe. That said, it would also be possible for Adobe, or any other software company, to lure us into using some flashy, non-portable extension that would effectively lock us out of our documents at the whim of said company. While we haven't yet fully addressed this issue, it is possible with existing technology. I also believe it is essential, if we aren't going to find ourselves stuck with ever-expanding back-catalogues of papers that need to be laboriously translated from one format to the next. **T.W. Smith**

No one can guarantee that information contained in electronic-only systems or mechanisms will be given assurance of accessibility in terms of centuries or even of decades. Electronic-only publications should be allowed, but this should be accompanied by the system archiving the information, at least on the nomenclatural acts in paper-based printouts that will be deposited and maintained at several institutions in each region. Losing the information in taxonomic works that include nomenclatural acts results in losing the communication media (the names) with which we exchange and share the information on organisms, including information in GenBank. **J. Kojima**

Article 8.1.3.2 refers to having a fixed format and gives a few examples. I guess you are right to avoid mandating specific formats here – they will change over time in any case – but then this could lead to debates over whether a particular format is ‘widely accessible’. At some point someone could choose to publish a paper in a minority format which might pose issues for current and future accessibility – who is to say whether this is valid or not? To avoid such disputes you might choose to add a recommendation as to which formats would be preferred/acceptable at the date of writing, and in this instance you should probably use an external list e.g. from a suitable archive or standards body rather than dream up one of your own.

M. Jackson

Format issues and retrievability in the future – Text content and print

Technical progress is irresistible, and the practice of biological nomenclature is not an exception. The authors of the proposed amendment well appreciate this, as well as the connected problems. These problems include the threat, first, of complete loss of irreplaceable primary documents in view of the evidently insufficient reliability of the current internet facilities, and, second, of tampering with these documents. No doubt, these threats are real and very serious, and the contradiction between them and the urgent necessity to legalise online nomenclatural activity is acute, but brooks no delay in its resolution. Is there any exit? I believe yes. We should only address our own history, I mean the history of our discipline, biological nomenclature. Long before the first Codes were established, scientists kept seeking for means to make the nomenclature of living beings stable and reliable in spite of the abundance of taxonomists, with all the diversity of their views, habits and idiosyncrasies. And the necessary device was eventually discovered, the type principle.

I don't think it is reasonable to scrutinise here the functions of the type principle. I dare to hope that the vast majority of the people interested in the present issue do understand, or at least feel subconsciously the profound importance of, the implementation of the type principle. That is why I simply propose to seek for an equivalent of the type specimen as applicable to online publications containing nomenclatural acts.

The first to come to mind is a hard (paper) copy of an online publication, kept in a scientific library or the like, which must be specified as permanently connected with the applicable name (i) in the primary publication and (ii) in at least one online depository of scientific names (Zoological Record or the like). Certainly it is preferable if several to many identical paper copies of the primary document were stored in relevant depositories. It is a subject for further discussion if these hard copies are to be considered analogues of syntypes (of equal legal virtue) or of a holotype and paratypes, and if there should be several obligatory depositories where these copies are to be kept.

Fortunately we now have widespread and quick communication tools, which make efficient discussion possible, with clear and speedy results. We have at least three years before the XXI Zoological Congress (2012). Given 2009 for discussing the basic principles and seeking for the best form of the type equivalent, 2010 for elaborating the actual Code amendments based on the consensus about the basic principles and instruments, and 2011 for discussing these specific amendments, we have a chance to meet that Congress with a finalised proposal of the amended Code. In summary, I

feel it premature to discuss the present Proposal in detail before the basic principles are sufficiently discussed. **A.P. Rasnitsyn**

With an increasing number of taxonomic publications coming to BioMed Central's open-access online journals (including both *BMC Evolutionary Biology* and *Parasites & Vectors*), I would like to reaffirm how beneficial it would be for the ICZN to update the Code as soon as possible to reflect the fact that the primary mode of scientific communication is now online, rather than print. Not only are new scientific journals (such as those from BioMed Central and PLoS) commonly online only, but I am hearing on an increasingly regular basis about traditional journals announcing plans to drop print. Without question, a serious commitment to preservation of the scientific record is vital – not just for taxonomy, but for all research. Online publishers such as BioMed Central have shown that commitment, and as long as publishers are meeting best practices for digital preservation, it seems clearly desirable that these publications should 'count' as publications from the perspective of zoological nomenclature. Note that e-publication does not, by any means, rule out the use of paper as one form of preservation for 'born-digital' content, and it is a form of preservation that libraries archiving digital content are free to use. Digital publications, incorporating the right to reuse and create derivative works, offer many benefits for taxonomy and taxonomic databases, so it would be very unfortunate for the Code to continue to act as an obstacle for taxonomists keen to work with open-access journals. **M. Cockerill**

Format issues and retrievability in the future – Images

An earlier comment said '*As long as we have binary computers, we will also have at least ASCII, and very likely also UTF-8 and XML*'. This issue is not whether it is binary or not, but how much (or how complex) technology is required to get it from the stored form to the human form, which in this case is the alphanumericpunctobet. This is something we can probably keep in our sights with textual information, but when it comes to digital images and other multimedia there is no equivalent of ASCII and we are already in *deep* trouble. **J. Croft**

Archiving issues

As far as lightning strikes, etc., destroying electronic-only publications, this is easily dealt with. If even just a few dozen major libraries, herbaria, or museums established servers to mirror each other's contents, we could rest assured that our electronic documents are at least as secure as our paper libraries. I've recently found a paper, published in 1989, that does not exist in any of my local libraries, or even in the personal library of the author! Yet I can still find usenet postings from that era, redundantly archived in a number of locations. I think this will inevitably be a big win for libraries. The cost of running a server is a fraction of the subscription fee for a major journal. And if something should happen that causes the simultaneous loss of all the servers at libraries around the world, chances are good that nomenclatural priority will not be among our most pressing concerns. That's my little rant on why open access, electronic publishing is a good and inevitable thing. **T.W. Smith**

The large (physical) libraries are handicapped by the need for ever more (expensive) physical storage space, on the one hand, and by being few and far between (and thus

relatively inaccessible), on the other hand. More and more of the existing literature will migrate to the www, with a varying degree of accessibility. The large physical library is a threatened species. Still, the issue for the moment is how to go about creating an electronic format for this 'unalterable document published at a single point in time', something like a notarised PDF with an unassailable voucher of authenticity ('unaltered since . . .'), preferably readable by a ubiquitous (and simple and un-updatable) piece of software. Note that the issue is not only to establish priority, but that a publication also establishes other details, some of which will perhaps become important only in a future Code (the Codes being retroactive).

P. van Rijckevorsel

It would be very helpful in future if some authority is made responsible for keeping hard copies of the electronic publications. May it be the already existing Open Archival Information System (OAIS) or something similar. **S. Singh**

Once an electronic manuscript is published in our journal it is guaranteed permanency by being listed in PubMed Central and also by being deposited in digital archives in the University of Potsdam in Germany, at INIST in France and in e-Depot, the National Library of the Netherlands' digital archive of all electronic publications. Our journal also participates in the British Library's e-journals pilot project, and plans to deposit copies of all articles with the British Library. **C. Arme**

I think that allowing e-only publication is an extremely bad idea. There should be a stipulation that paper copies are deposited in five named public libraries as there is currently. Paper is proven to last hundreds or thousands of years, and electronic media are notoriously ephemeral. This is the view too of the British Library where I recently attended a meeting on archiving. It would be disastrous if this wasn't a requirement. People place too much trust in modern technology! **G. Beccaloni**

There isn't a clean dividing line between electronic and paper publication. If there is a requirement for a publication to be printed on acid free paper and lodged in, for example, ten libraries, it circumvents many of the issues with archival permanence. The problem with this may be in the inability of the libraries to cope with such an approach. Single papers are likely to be treated as manuscripts or reprints and with less care than 'real' journals. Furthermore, how would we know that the paper has been deposited correctly? From a digital perspective so long as the paper is open access anyone with an interest can keep a copy and print it if they like or archive it in their own databases. Like so many of these debates it tends to get polarised and distracted into talk of how long media types last etc., which is a red herring. Nobody has this debate about journals and the paper stock they use! I would suggest the solution is to allow electronic publication provided it is open access so that people can take copies and archive them. There are other requirements but these would be the key ones. Kill two birds with one stone. **R. Hyam**

Likelihood and economics of file migration

With all the talk of formats and migration of important documents, although we claim to be looking to the future, we are actually looking at the past. The volume of data is or will be so huge that it will be impossible to verify it all at each technology migration point, and glitches, once introduced, might not be detected and will be

propagated through future iterations. It was not perfect in the olden days and the equivalent were errors of translation and transcription – but the generation times were much much longer and there was always likely to be an ‘original’ somewhere to go back to. **J. Croft**

As I see it there are two aspects of this discussion: #1. Do we currently have the infrastructure for all-electronic taxonomic publications? #2. Will that infrastructure continue to exist in the centuries to come in a way that guarantees continual access to *all* such electronic publications? If #1 is not met, then #2 becomes redundant. However, I think that most will agree that the current infrastructure for electronic publications (taxonomic and otherwise) is at least as good as the one for paper publications, in which case, 1) can we assure that these publications will continue to exist in the future? and 2) will the publications still be accessible (i.e. will we have the hardware/software needed to read them)? [. . .] As I see it the solution to 1) is not one or two but many big electronic libraries where everything is stored. Memory (at least the electronic kind) is very cheap and there is no reason why there can't be one or more global electronic libraries in each country. Even if only 50% of the earth's countries had such libraries it would still leave us with 90 of them (how many copies of most early 19th century publications are still around?); and additional copies will still exist on personal computers, external hard drives etc. Lightning can strike, both literally and metaphorically, and it can hit ordinary libraries as well [. . .] so I think it is reasonable to say that electronic publications are as safe as paper ones. [. . .] As for 2), if there is a need and a demand for software that can read 50+ year old documents then that demand will be met, if not by the software companies, then by the scientific community itself. Much scientific software is continuously being developed by scientists rather than by Adobe, Microsoft and Apple and, though the future holds many uncertainties, I am convinced that trend will continue. **T. Simonsen**

What constitutes a publication? Who is a publisher?

This may be a silly question but ‘who is a publisher?’ I have two websites hosted by the American Museum for Natural History and the University of Nottingham respectively. The responsibility for content, however, lies with myself. Presently the sites contain material relating to what appear to be new species but I accept that under the existing rules none constitute formal publication. The new rules, however, seem to suggest that if I submitted the new names for registration they would become valid. The problem but also great merit of website writing is the capacity to move knowledge along at a rapid rate. I, for instance, have been overwhelmed with specimens from ecological collections and the very time-consuming process of preparing and submitting manuscripts for journals, such as *Zootaxa*, with differing styles and formats, is a real negative. **B. Taylor**

The ICZN has not promoted that some journals (*BMC Evolutionary Biology*, *BMC Microbiology*, *Parasites and Vectors*, *Frontiers in Zoology*, *PLoS ONE*) have already been publishing new names in an electronic-only form. Also we haven't promoted that most journals of professional publishers (many thousands, not only the several mentioned in this discussion) are published online many months in advance to the print version. It just happens. It happens because the scientific community seems to

prefer rapid communication. The Amendment tries to find a solution for this situation by giving guidelines for publication practices that are currently in place without guidelines. If we get a PDF of a publication, how do we know whether a paper copy exists? Do we ever check the original paper copy before citing the PDF for nomenclatural purposes? Most of us are far away from a comprehensive library. With increasing replacement of reprints by PDFs and increasing proportion of electronically delivered interlibrary loans, it is difficult to determine whether a paper copy exists. We just assume. **F. Krell**

It sounds as though anything that someone can get appropriately archived and accessible online would be nomenclaturally legal. This is already a problem with essentially self-published paper volumes; allowing it online would only make it easier for someone to cause lots of headaches and extra work for serious taxonomists by legalising a lot of poorly justified names. (Of course, not all self-published materials are of poor quality, but I suspect almost all of us can think of someone who (in our opinions) could advance the science of taxonomy by ceasing to publish taxonomic work). **D. Campbell**

The future of publishing small journals and survival of taxonomic societies

It seems self-evident that this system would be the death of entomological societies that publish journals heavily taxonomic in orientation. That affects all of us, well beyond those printing houses rolling in profits from taxonomy (yes, that was sarcasm), including students who might have become interested in the field. I also believe that the specific assertion that 'most relevant is the fact that it would put taxonomy (again) in its central scientific position' is completely incorrect. More relevant is the fact that taxonomy would become a sequestered science, irrelevant to and unread by anyone not doing taxonomy. Taxonomy would completely lose the readership of all the journals that currently publish taxonomic work. Out-of-sight, out-of-mind. Taxonomy would hardly be central to science in that context – rather, it would be its own private club. **S.D. Gaimari**

In response to discussion of a proposed open-wiki, single-outlet system for all taxonomy: I am very strongly in favour of this amendment. Contrary to some arguments, new taxon descriptions published electronically will be much more readily available to researchers around the world than are print versions. Passing of this amendment will also allow journals that are struggling financially because of the requirement for hard copies of descriptions to go entirely electronic, which may allow them to continue to exist rather than having to fold. **H.C. Proctor**